

REMARKS

The comments of the Examiner as set forth in the office action of January 31, 2006 have been carefully studied and reviewed.

Claims 1-3, 7-8 and 10-11 stand rejected as being anticipated by Stevens. Claim 1 has been canceled and replaced by new claim 19. New claim 19 includes many of the limitations formerly found in claim 1 plus additional limitations relating to spectral range and the fact that the method or process is aimed at the removal of ammonia.

Claim 19 is directed to removing ammonia from a gaseous effluent stream emitted by an industrial process. That is the gas stream being treated is from an industrial process which produces a gas stream having ammonia in the gas stream as a result of the industrial process. In Stevens, the process is not aimed at removing ammonia. Indeed, in the Stevens process, ammonia is added to the gas stream for the express purpose of removing NO_x and SO₂. Ammonia is not even a concern of Stevens. It is true that the ammonia injected into the process is coincidentally converted to NH₂ and H, but that is simply a part of the process of removing NO_x and SO₂. Indeed, as noted above, instead of Stevens actually attempting to remove ammonia from the gas stream actually produced by an industrial process, Stevens adds ammonia to the gas stream. Stevens is silent concerning ammonia in a gas stream produced by an industrial process. It must be assumed that there is no substantial ammonia in such a gaseous effluent stream since Stevens teaches adding ammonia.

In addition, claim 19 calls for the method to deal with a gaseous effluent stream having a relatively low ammonia concentration. The claim calls for the ammonia concentration produced by the gaseous stream emitted by the industrial process to contain less than approximately 40 parts per million (approximately 1.65×10^{-6} gram moles/liter) of ammonia. Again, Stevens aims at increasing the ammonia concentration in the gas stream by adding ammonia. There is no teaching of dealing with a gaseous effluent stream having these low levels of ammonia contained therein. Indeed, Stevens teaches that the ammonia must be present at

concentrations of at least 5×10^{-6} moles/liter, and preferably in the range of 1×10^{-6} to 1×10^{-3} moles/liter. This is far in excess of the 40 ppm level set forth in claim 19.

In addition, other teachings of Stevens show that the concentration of ammonia in the Stevens' process is many times greater than the threshold ammonia concentration set forth in claim 19. Stevens refers to the photochemical destruction of highly toxic hydrazine. This compound forms only due to extremely high concentrations of ammonia specified by Stevens. The ammonia concentrations set forth in Applicant's claims are a factor of 10 to 100 less than the ammonia concentrations required by Stevens. Thus, as discussed above, Stevens explicitly sets forth ammonia concentration thresholds that lie outside of the scope of claim 19. But, the reference to a photochemical process for destroying hydrazine is another clear indication that the ammonia concentration in Stevens fall far outside of the claimed range.

Furthermore, claim 19 calls for substantially reducing this low level concentration of ammonia in the gas stream. There is no reduction of such a low level of ammonia concentration in Stevens. It is undisputed that Stevens injects ammonia into the gas stream in order to remove NO_x and SO₂. That undisputed fact makes it impossible for there to be a factual finding that Stevens substantially reduces the ammonia concentration in the gas stream. That is, one cannot on the one hand substantially reduce the concentration of ammonia in a gas stream, and at the same time purposely add ammonia to the gas stream.

Claim 19 also calls for the method or process to irradiate the gas stream in a spectral range of 230 to 370 nanometers. Stevens is clear on this point. In Stevens the spectral range is 170 to 220 nanometers. Stevens emphasizes this spectral range as follows:

When the wavelength of the ultraviolet radiation employed in the irradiation step is in the range about 170 nm to 220 nm, particularly in the range about 190 to 220 nm, the NH₃ gas present in the mixture absorbs the radiation strongly. Above about 220 nm the efficiency of the process is impaired as the degree to which NH₃ absorbs radiation drops off sharply with wavelength higher than about 220 nm and therefore only negligibly small concentrations of amino radical are generated....if the wavelength ...is increased much above 220 nm the concentrations of

ammonia that need to be employed, and the intensity of the radiation that is required, in order to achieve removal of NO_x within reasonable times, rapidly becomes impracticably large.

Stevens, col. 2, lines 45-62.

It is clear from this statement that the Stevens process is not intended to operate in a spectral range higher than 220 nanometers.

Claim 19 is also limited to the photolysis being initiated by the energy of the ultraviolet light in the particular recited spectral range of 230-370 nanometers. That is, the resulting photolysis and the set of free radical reactions are caused and set in motion by the ultraviolet light within this particular spectral range. In Stevens, the photolysis and any free radical reactions are set in motion by the ultraviolet light in the spectral range of 170-220 nanometers. That is, Stevens teaches a photochemical process that is initiated by the absorption of UV light by ammonia. This is clearly indicated by Stevens in col. 1, lines 12-15, and col. 3, lines 1-10. In Applicant's process, the photochemical process is initiated by the absorption of UV light by nitrogen dioxide and by reaction products such as ozone and hydrogen peroxide. Due to the spectral range claimed in Applicant's process, ammonia is not the subject of photolysis. A photochemical process based on the absorption of UV light by one specific compound does not anticipate, or even make obvious, different photochemical processes designed to cause the photolysis of quite different compounds.

Claim 19 also calls for a process that includes maintaining a NO_x concentration in the gas stream at a concentration level sufficient to maintain in the gas stream the active set of hydroxyl and hydroperoxy free radical reactions. The Examiner, in the office action, continues to maintain that Stevens meets this limitation even though, without any doubt, the entire purpose and aim of Stevens is to remove as much NO_x as possible. Apparently the position of the Examiner is that this is an explicit teaching, and that the Examiner is not relying on the doctrine of inherency. It is interesting to note that the position of the Examiner has changed from the last office action. Prior to the present office action, the Examiner specifically found that

Stevens did not maintain the NO_x concentration in the gas stream at a concentration level sufficient to maintain in the gas stream the active set of free radical reactions. Apparently the Examiner has determined that his first factual finding was in error. Respectfully, the Examiner's first factual finding was correct. The singular goal of the Stevens process is to remove NO_x and SO₂. The Patent Office will not dispute that fact. Thus, it becomes difficult to understand and appreciate that if the goal of Stevens is to remove the NO_x from the gas stream, then how could Stevens teach maintaining the NO_x concentration in the gas stream at a concentration sufficient to support the active set of free radical reactions. Applicant's claim is more than simply stating that small or minuscule concentration of NO_x can be found in a gas stream. Rather, Applicant's claim calls for "maintaining" the NO_x concentration. The Applicant clearly states that the intent of the invention is to convert NO to NO₂ in a manner in which the total concentration of NO_x (sum of NO and NO₂) is not "substantially reduced." That is, it is the object and purpose of the Applicant's process not to remove and get rid of NO_x, but to convert as much of the NO_x over to the NO₂ form to maintain a certain level of NO_x concentration in the gas stream that is almost equal to the inlet concentration of NO_x. If a stated goal of Stevens is to remove NO_x, then it is impossible to find that the Stevens process is "maintaining" a sufficient level of NO_x to cause the free radical reactions set forth in claim 19.

The Examiner argued that sensors are located in the duct and in the stack, and are responsive to concentrations of SO₂ and NO_x and serve to increase the rate of addition of NH₃ as the concentrations of SO₂ and NO_x increase. Final Office Action, p. 4. However, Stevens states as follows:

The rate of addition of ammonia may be calculated so that there is sufficient to react with the SO₃ and HCl and leave an excess of ammonia over the concentration required during the photolysis stem i.e. generally in the above mentioned range of about 5×10^{-6} to about 5×10^{-3} mol/l. Alternatively, and more desirably, the rate of addition of NH₃ may be controlled automatically in response to sensors located in the duct 7 and in the stack 13, the former sensors being responsive to the concentrations of SO₂ and NO_x and serving to increase the rate of addition of NH₃ as the

concentrations of SO₂ and/or NOx increase and the latter sensors being response to the presence of NH₃ and serving to decrease the rate of addition of NH₃ when the concentration of unconsumed NH₃ in the stack gases rise about a predetermined limit.

Stevens patent, col. 5, lines 55-68.

It is apparent that the purpose of the sensor, often termed "continuous emission concentration monitors," is to determine when it is necessary to increase the ratio of ammonia to NO_x in order to efficiently destruct the NO_x in accordance with Stevens' reactions 2 and 3 shown in col. 1, lines 22-24. It is not the purpose of the sensor to ensure that a certain level of NO_x is maintained. The intent of the Stevens' process is to achieve the maximum possible NO destruction.

Claim 12 and the claims dependent therefrom are directed to a method of producing cement and removing ammonia from a gas stream produced. In other words, the claim is directed to a cement manufacturing process. The Patent Office has rejected these claims as being unpatentable over Stevens, U.S. Patent No. 4,416,748, in view of Kupper et al. As discussed below, the Patent Office has not made out a prima facie case of obviousness and the Patent Office is respectfully requested to withdraw the rejection of these claims.

It is well settled that in order to make out a prima facie case of obviousness based on combining two patents, that the Patent Office must prove by a preponderance of evidence that there is a motivation for combining the two references. There is no motivation to combine in this case.

In this obviousness rejection, Stevens forms the primary reference. The Patent Office acknowledges that Stevens does not disclose directing a raw feed into a pyroprocessing system of a cement manufacturing facility. Indeed, there is nothing in Stevens related to cement manufacturing. In addition, the Patent Office acknowledges that Stevens does not teach or suggest heating the raw feed that moves through the power processing system. Furthermore, the Patent Office acknowledges that Stevens does not teach directing the heated raw feed

through at least one kiln that forms a part of the power processing system. In addition, the Patent Office acknowledges that Stevens does not produce cement clinker. In addition, the Patent Office acknowledges that Stevens does not show heating the pyroprocessing system and directing the resulting gas stream through the pyroprocessing system.

The Patent Office then maintains that it would be obvious to modify Stevens by turning Stevens into a cement manufacturing facility. Essentially the Patent Office maintains that it would be obvious to modify Stevens to include all of the steps and processes referred to above that the Patent Office acknowledges is not present in Stevens. It is difficult to discern what the proffered motivation is in this case. However, from pages 10 and 11 of the office action, the Examiner maintains that it would be obvious to modify Stevens as discussed above:

because when the photolysis reaction is applied to a flue gas obtained from a conventional combustion process such as the production of cement clinker, the plant for the production of this cement clinker would have contained a preheater 1 which serves for preheating and at least partially deacidification of the raw material and a rotary kiln 2 which serves for final burning of the preheated and deacidified material as taught by Kupper (col. 5, lines 46-65; and Fig. 1), and thus, steps (A), (B), and (C) would have been carried out.

Final Office Action, p. 11.

There is no motivation found in this statement. That is, there is nothing contained herein which reveals any proof or evidence as to why a person of ordinary skill in the art would desire to modify Stevens to essentially make it a cement manufacturing plant. Simply because it is possible to modify Stevens to make it a cement manufacturing plant does not make it obvious to do so in the absence of some motivation or suggestion in the prior art to modify Stevens. Respectfully, this combination is inspired only by hindsight.

Respectfully submitted,

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